MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

TCP2201 OBJECT ORIENTED ANALYSIS AND DESIGN

(All sections/groups)

16 OCTOBER 2017
2:30 P.M – 4:30 P.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

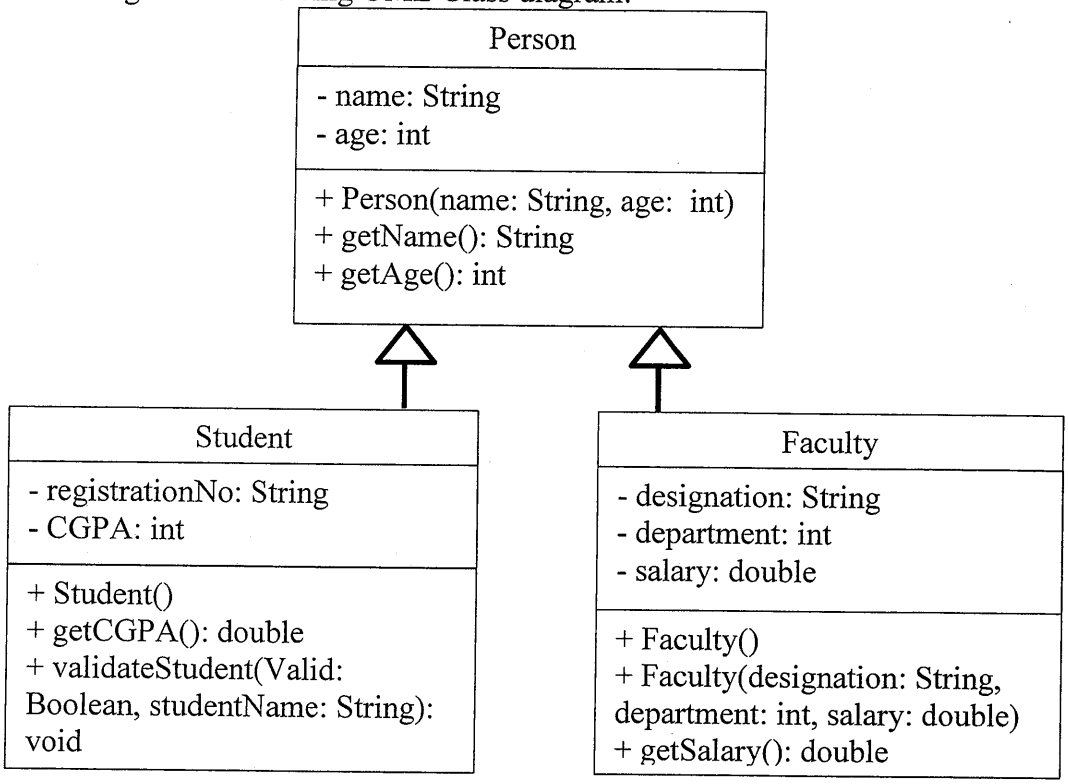
1. This question paper consists of 6 pages with 4 questions only.
2. Answer **ALL QUESTIONS**.
3. All questions carry equal marks (10 marks) and the distribution of the marks for each sub-question is given.
4. Write your answers in the answer booklet provided.

Question 1

a) Briefly define the following terminologies in Java programming language.

i. Class
ii. Inheritance
iii. Interface
iv. Package
v. Polymorphism [2.5 marks]

b) Referring to the following UML Class diagram:



i. What is the relationship between **Person** and **Student**? [0.5 mark]
ii. How is the relationship in (i) implemented in Java? [0.5 mark]
iii. Write the Java code for **Person** including its attributes and methods. Ensure that each method body is filled up with the necessary code. [2 marks]
iv. Write the Java code for **Faculty** and make sure that it maintains the correct relationship with **Person**. Again, ensure that the method are filled up with the necessary code. [2 marks]
v. What should be the Java code to upcast an object **f** of the **Faculty** class to **m** of the **Person** class in the blank below?
[Note: Write the code in the answer booklet.] [0.5 mark]

```
Faculty f = new Faculty();
[                          ]//Upcast m to become Faculty class
```

Continued...

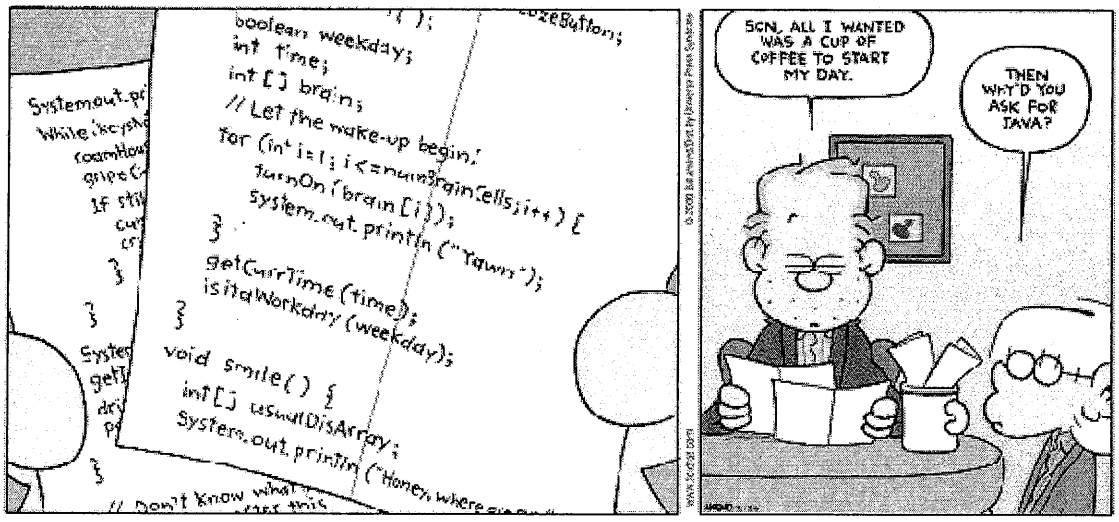
c) For each of the following statements, determine if it is True (T) or False (F).

i. Downcasting is always safe because a superclass instance possesses all the properties of its subclass and can do whatever its subclass can do.

ii. The *@Override* keyword is used to check whether there is such a method in the superclass to be overridden.

iii. Consider using *abstract* classes if you want to share code among several closely related classes.

iv. A variable declared as *final* may only be initialized once (during declaration) and cannot be changed during run-time. [2 marks]



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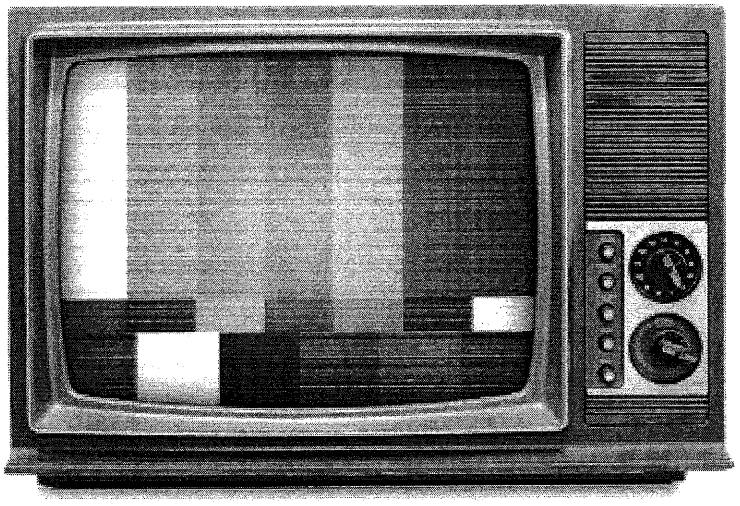
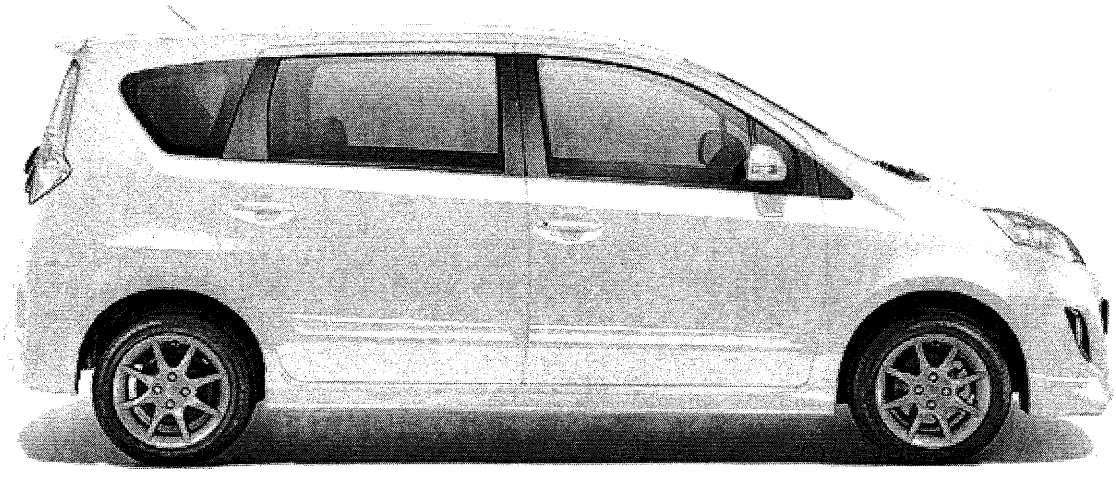
Question 2

a) You are designing software for a television. You should apply encapsulation and abstraction in your design. Explain how encapsulation and abstraction is being applied on the television, its display screen and the inner implementation details of Television. What is the difference between Encapsulation and Abstraction? [4 marks]



b) What is the difference between `System.out`, `System.err` and `System.in`? [3 marks]

c) What is the relationship between a Vehicle and its Wheel? Explain your answer. [3 marks]



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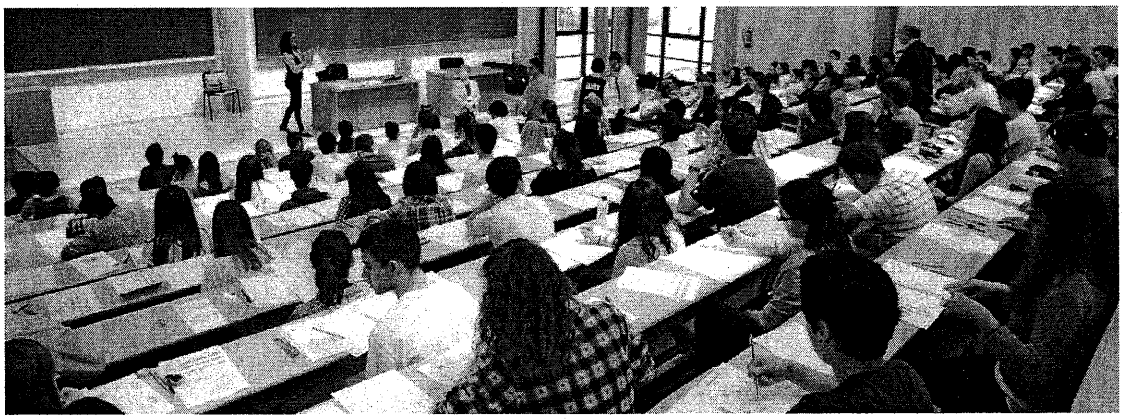
Question 3

a) In the code below, what are the lines where content coupling happens? Explain why those lines show content coupling. [4 marks]

```
1   public class MyClass{
2         public int x;
3         ...
4         public int getX() {return x;}
5   }
6
7   public class bClass{
8         private MyClass myObject = new MyClass();
9         ...
10        public void calculate (int newInt){
11            myObject.x = x + newInt;
12        }
13  }
```

b) Draw a sequence diagram illustrating the following scenario. [6 marks]

Before an exam, a lecturer first notifies the students of the exam date and the material to be covered. She then prepares the exam paper, with sample solutions, makes enough copies for the class, and hands the questions to the students during the exam. The students write their answers to the exam questions and hand in their papers to the lecturer. The lecturer then gives the exam papers to the tutors, along with the same solutions for each question, and gets them to mark it. She then records all marks and returns the papers to the students.



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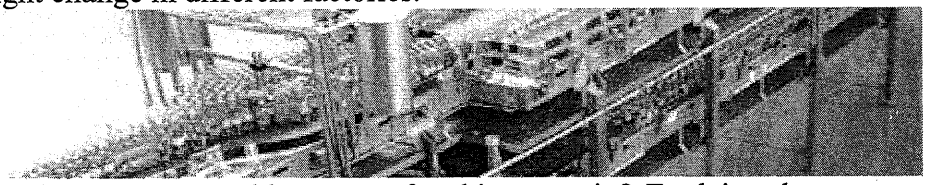
Question 4

a) Please state what category these design patterns are in, and describe each one.
   i. Iterator
   ii. Singleton [4 marks]

b) You are designing a module in the manufacturing system that monitors various machines on the factory floor. Many different other modules will need to know when the status of the various machines that your module takes care of changes, and you have to allow for the fact that such modules may be added in the future, and might change in different factories.



What design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

Warning: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked.
[3 marks]

c) Your company's system uses a third-party hardware system for printing designs on cans from InnoTech Sdn. Bhd. but it is starting to wear out. You cannot buy a new piece of this can-printing hardware because InnoTech went out of business 5 years ago. ZoomVec Sdn. Bhd. sells a very good can-printing system which would be excellent as a replacement, except that their interface is different from the InnoTech one that your company's software is used to.

What design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

Warning: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked.
[3 marks]

End of paper